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Educational Television Series 1968-69

Teachers' Guide

Geography SENIOR DIVISION

Landforms of Ontario

Educational Television Branch
ONTARIO DEPARTMENT OF EDUCATION
1670 Bayview Avenue, Toronto 17

GEOGRAPHY
Senior Division
LANDFORMS OF ONTARIO

9 programs of 15 minutes each for students in Grade 11 with general interest for Grades 7 and 13.

Repeated from 1967-68.

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Please address inquiries and comments concerning this series:

Assistant Superintendent,
Geography Division,
Education Section,
ETV Branch,
1670 Bayview Avenue,
Toronto 17.

INTRODUCTION

What? Where? Why? How? The basic questions of geography. This series which focuses on the Ontario landscape attempts to answer these questions in two ways—first of all by examining the processes that have helped to shape the landforms that surround us, and second by looking at how the physical environment has influenced the manner in which we live, work and play.

From the variety of Ontario landscapes a representative cross section has been chosen for presentation. An attempt has been made to strike a proper balance between physical and human geography so that while the series is primarily intended for Grade 11 students, it may profitably be used for studies in regional geography in Grade 13 or for general interest for Grade 7. The shorter program length has been chosen to achieve greater flexibility in working the series into the school schedule.

Although there is little interdependency between programs, and each is a complete unit in itself, the arrangement of the programs is designed to follow a logical sequence. In the first three programs, the physical evolution of Ontario is traced; first by looking at the structure of the underlying bedrock, then by considering the processes and effects of Pleistocene glaciation. The next four programs probe specific landforms or landform regions to examine their formation, characteristics and usefulness to man. Finally, tow integrated regional studies are presented; the Lakehead Region and the Ottawa Valley. In these two programs the inter-relationship between man and his environment is explored and studied.

In planning this series it was considered desirable to make the programs embryonic rather than conclusive. Consequently no attempt has been made to exhaust the subject matter of each topic. Rather our aim has been to stimulate further inquiry and classroom discussion. In this way the programs can achieve their greatest educational value.

PROGRAM 1

THE GEOGRAPHICAL FOUNDATIONS

The primary purpose is to provide background information about the underlying bedrock structure of Ontario which will be useful in understanding subsequent programs. A second purpose is to provide increased clarification of prominent rock outcroppings through an explanation of their age, formation and predominant characteristics.

PROGRAM CONTENT

Part of the reason for the infinite variety in the Ontario landscape lies in the bedrock structure or build of this area.

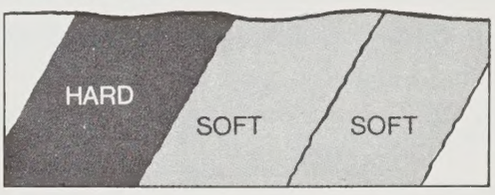
The oldest rock here dates from the Precambrian geologic period, some 1,000 million years ago. This very hard, resistant crystalline rock is today seen in exposed outcroppings on the Canadian Shield and its southern extension, the Frontenac Axis (near Kingston).

Since then our area has been subjected to several periods when the land sank and was inundated by huge seas. During the Cambrian, Ordovician, Silurian and Devonian periods deposition by these seas left layer after layer of sediments that compacted into rock strata. The remains of characteristic plants and animals, trapped in these sediments, became fossilized and today give us a clue about life in those ancient times.

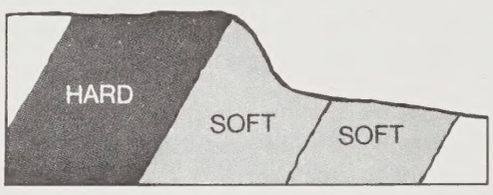
On top of the Precambrian rock we can distinguish four main layers of sedimentary rock corresponding to these geologic periods.

Since the end of the Devonian period, some 345 million years ago, these rocks have been exposed to many agents of gradation. Differences in the resistance of rocks to erosion have resulted in many of our topographic features. Sometimes a harder layer, lying on top, will protect weaker ones underneath from erosion, thus creating cliffs or escarpments.

1. Before Erosion



2. After Erosion



Here in Ontario are many examples of this, but certainly the most prominent is the Niagara Escarpment, which will be the subject of our fourth program.

To conclude our program the camera takes us on a traverse from Kingston westward toward Sarnia. On this traverse, progressively younger rocks are encountered as we move from the oldest Precambrian at Kingston to the youngest Devonian outcroppings along the Lake Huron shoreline.

POINTS OF EMPHASIS

1. Formation of sedimentary rock
2. Development of escarpments
3. East-to-west sequence of rocks in Ontario

Geologic Period	Beginning of Period (Millions of years ago)	Common Rocks	Prominent Ontario Outcropping	Common Fossils
Devonian	405	Chert Shale Limestone	Port Colbourne Kettle Point Arkona	Brachiopods Fossil Coral
Silurian	425	Sandstone Shale Limestone	Niagara Escarpment	Brachiopods Shell Fish
Ordovician	500	Limestone Shale	Kingston area Erindale	Cephalopods Crinoids
Cambrian	600	Sandstone	Near Joyceville	Trilobite

SUGGESTED PRE-VIEWING ACTIVITIES

1. Students should have some knowledge of the geologic time sequence and be familiar with the characteristics of igneous and sedimentary rocks.

2. Review a geologic map of Ontario.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss local bedrock characteristics.

2. Why is Ontario not likely to experience a major earthquake?

3. Discuss the influence bedrock may have on a city's skyline. (Compare Toronto with Los Angeles.)

4. Why is the Shield our main source of metallic minerals?

VOCABULARY

bedrock, build, escarpment, Precambrian, Cambrian, Ordovician, Silurian, Devonian.

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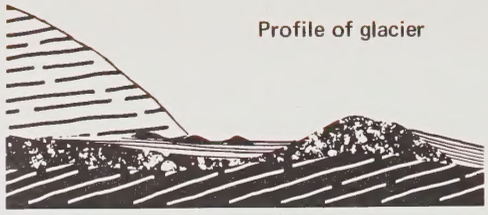

PROGRAM 2

LANDSCAPE SCULPTOR

In our first program, we discussed the sub-surface bedrock structure. This program aims to show how glaciation has modified the surface of the land by examining the way in which glaciers are formed, move forward, and by erosion, transportation and deposition mould new landform features.

PROGRAM CONTENT

One of the greatest influences in shaping the surface topography of Ontario has been ice—ice that built up in huge glaciers which moved down from the north and covered most of Canada and the northern U.S. Four times during the Pleistocene Period cooling climates allowed this accumulation of ice to occur. Each of these advances has been named after the state in which their tills are best preserved, i.e. Nebraskan, Kansan, Illinoian, Wisconsin.

In Ontario it is the Wisconsin ice, the most recent of the advances, with which we are most familiar. This sheet, which in places reached thicknesses of up to two miles, advanced from four centres — the Cordillera, Keewatin, Labrador and Greenland. Ice from the Labrador centre flowed over most of Ontario thereby helping to form many of the landforms we see.

How did this ice build up? What caused it to flow? Why was material carried and deposited? Where can these glacial features be seen? These are some of the questions answered by this program as it attempts to explain the formation of moraines, drumlins and till plains.

The moraines of Ontario are, for the most part, located in a horseshoe-like pattern around the highlands of Western Ontario. (For a detailed description of how these particular moraines were formed see pages 26-32 of Chapman and Putnam: *The Physiography of Southern Ontario.)* These moraines are all recessional or end moraines, being formed during stages in the retreat of Wisconsin Ice.

Drumlins are a matter of some speculation. While their formation remains a mystery to us, it does appear that in Ontario there is some relationship between the drumlin fields and the edge of the Canadian Shield. In any event they do have certain peculiar characteristics which are probed by our program.

Finally we observe the formation of the Ontario till plains which vary in composition from the very stony Drummer plains to the relatively stone-free plains around Stratford.

This completes our examination of the main depositional features of Pleistocene glaciation. Unanswered is the question, "What happens when the glacier starts to melt and all that water is released? " This matter we turn to in program three.

POINTS OF EMPHASIS

1. Extent and thickness of ice

2. "Conveyor Belt" concept of glacial movement

3. Formation and characteristics of Moraines, Drumlins and Till Plains.

SUGGESTED PRE-VIEWING ACTIVITIES

No particular preparation is needed or suggested for this program. Teachers may wish to use this program to introduce continental glaciation, or to use it as a review and/or application to Ontario.

SUGGESTED POST-VIEWING ACTIVITIES

1. Prepare a cross sectional diagram of a glacier to show
   - Ice characteristics,
   - Material carried by glacier,
   - Material deposited by glacier.

2. Morainic ridges are sometimes used for the cultivation of tree fruits. Why?

3. Suggest reasons why the Drummer Till Plain is more stony than the Stratford Till Plain.

4. Discuss the economic advantages and disadvantages that glacial deposits present to man.

VOCABULARY

Pleistocene, Wisconsin glaciation, glacial till, moraine, drumlin, till plain.

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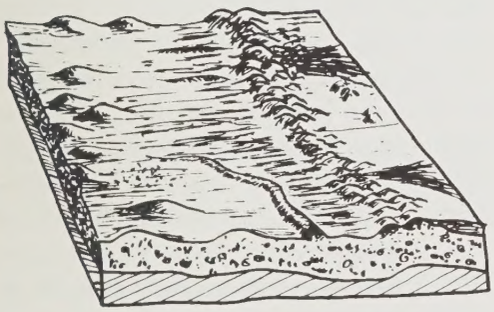

Outwash plain showing Eskers, Kettles, Spillways and Kame

PROGRAM 3

THE WORK OF THE MELTWATER

This program continues, from program two, our study of the effects of glaciation upon the landscape. The purpose of this program is to explain those features associated with the action of water released from the melting glacier.

PROGRAM CONTENT

The immense glaciers that covered this continent during Pleistocene time contained fantastic volumes of water that were released once the glacier started to melt and waste away. This water, interrupted in its normal hydrologic cycle, became an important landscape modifier as it again sought its way to the sea. This program examines the more important of these fluvioglacial effects.

In the present Great Lakes Basin were a succession of post glacial lakes – Maumee, Whittlesey, Warren, Algonquin, Nipissing, Iroquois, etc. Our camera probes the effects of these lakes on our present day landscape: the clay plains, the sand plains that mark former deltas, and the old lake shorelines best typified by that below Casa Loma in Toronto.

Broad valleys, called spillways, indicate the path taken by the meltwater. Many of these still contain misfit streams that mark the former river course, while others have long since dried up or become swamps.

We see some of the many uses to which these valleys may be put.

Our attention is next turned to eskers, those long sinuous ridges that snake across the landscape. How were they formed? What is their importance today? Where may they be seen? Graphic sequences, cross sections, and photographs provide the answers.

Kames are another important fluvioglacial feature. Our camera takes us to what is probably the best known of these – the Font Hill Kame – while again, graphic sequences are used to explain their formation.

Finally, we overview the effects of glaciation by quickly reviewing the features discussed in both programs two and three. Thus we are impressed with the tremendous influence the glaciers have had in moulding our landscape. Is this influence over or is there more to come?

POINTS OF EMPHASIS

1. Tremendous volume of water released by melting glacier

2. Landform features formed by this water

3. Man's use of these features

SUGGESTED PRE-VIEWING ACTIVITIES

1. The best preparation for this program is the viewing of program two.

2. Some discussion of the work of water in eroding, transporting and depositing material is advisable.

3. The program may, however, be used without preparation to introduce fluvio-glacial features, or may be used as a review showing their presence in Ontario.

SUGGESTED POST-VIEWING ACTIVITIES

1. Why would the beds of old glacial lakes make excellent agricultural land?

2. By means of fully labelled diagrams trace the formation of an esker.

3. List different types of land use that might profitably be carried on in a spillway valley.

4. Discuss the economic value of kames and eskers to man.

VOCABULARY

fluvioglacial, eskers, kame, lacustrine plain, glacial ponding, spillway, misfit stream.

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CHAPMAN & PUTNAM, *The Physiography of Southern Ontario,* Second Edition, University of Toronto Press, Toronto 1966.

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PROGRAM 4

THE NIAGARA ESCARPMENT

This program is the first of two devoted to an examination of the Niagara Escarpment. An attempt is made to explain the physical evolution of this prominent feature; first, by analyzing its structure and then by describing those processes that, in the last 405 million years, have helped to shape its present appearance.

PROGRAM CONTENT

The Niagara Escarpment is probably one of the most prominent of the Ontario

landforms. From just south of Rochester, New York, it curves like a giant horseshoe through Ontario, Lakes Huron and Michigan, and into the state of Wisconsin. In Ontario it forms a sharp boundary between the Silurian rocks to the west and the Ordovician rocks to the east.

But how did it get there? Our story starts with the seas — the Ordovician, Silurian and Devonian seas that left thick layers of sedimentary rock on top of the igneous Precambrian series. Of these rocks the Ordovician and Devonian were softer and more easily eroded than the Silurian layers. Of the latter, perhaps the most significant in the formation of the escarpment was dolomite — a particular type of limestone that contains magnesium and is very hard and resistant to erosion. Since these rocks are all part of a larger formation (the Michigan Basin) the layers in Ontario all dip in a westerly direction from the Precambrian highlands to the east.

With the final retreat of the sea, the processes of erosion began their work. Rivers began cutting a network of valleys and carrying the material away to new areas. And always erosion was faster in the Devonian and Ordovician rocks than in the harder Silurian ones. Thus, after many millions of years of erosion, the hard dolomite layer, overlying and protecting softer strata, began to emerge as an escarpment. By the time the first Pleistocene glaciers arrived, the escarpment had pretty well taken its present basic shape. The blanket of ice simply added the final touches, clothing the framework with a veneer of glacial debris that in some places almost completely obliterates the original rock face.

It must be remembered that the present Niagara Escarpment is simply a stage in an unceasing erosional process. This is perhaps best typified by the Niagara River and its world-famous falls. In the last 12,000 years this cascading torrent has carved a gorge through the escarpment of seven miles — an average of over three feet per year! It has been estimated that the evolution of the escarpment to its present form took 300 million years.

What influence has this escarpment had upon man? This is the subject of our next program.

POINTS OF EMPHASIS

1. Structure of Michigan Basin
2. Dolomite cap rock and formation of escarpment
3. Effects of glaciation

SUGGESTED PRE-VIEWING ACTIVITIES

1. A review and discussion of the material covered in program one, particularly those sections dealing with rock structure and scarp development, would be desirable and helpful.
2. Teachers may want to use this program to review the work of running water and continental glaciation.

SUGGESTED POST-VIEWING ACTIVITIES

1. Prepare a cross-sectional profile to show how the dolomite layer protects the weaker rocks from erosion and thus creates an escarpment.
2. Explain why the Pleistocene glaciers did not erode the whole escarpment away.
3. Suggest ways in which the escarpment might influence the activities of man.

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CHAPMAN & PUTNAM, *The Physiography of Southern Ontario,* Second Edition, U. of T. Press, Toronto 1966.

STOCKWELL C.H. (Editor), *Geology and Economic Minerals of Canada,* (Economic Geology Series I) Queen's Printer, Ottawa, 1963.

TOVELL W.M., *The Niagara Escarpment,* Royal Ontario Museum, University of Toronto, 1965.

VOCABULARY

escarpment, cuesta, dip slope, dolomite, cap rock, Michigan Basin.

PROGRAM 5

MAN ON THE ESCARPMENT

In the previous program the physical evolution of the Niagara Escarpment was outlined. In this program an attempt is made to show how the escarpment has influenced the lives of the people living in this region.

PROGRAM CONTENT

The picturesque Niagara Escarpment stretches some 400 miles across Ontario providing us with some of our most impressive scenery. But what effect has it had on our lives or economic activities? Is its effect greater now than in the past? Is it a hindrance or a help?

The escarpment has always been a major transportation barrier. It was formidable, indeed, to the early settlers and their horse drawn vehicles, who, therefore, built their roads in the flat land between the foot of the escarpment and the lake. Later on, the railway builders were forced to seek out old water gaps to find a gradient suitable for locomotives to handle. Explorers and fur traders found that falls blocked the rivers and streams to canoe traffic, while today the greatly enlarged Welland Canal can still be a major bottleneck in the Seaway system. Even our motor vehicles which speed up and down the escarpment with relative ease do so mainly through water eroded or man-blasted notches in the wall.

The escarpment has not been without its advantages. Early settlements made use of small water falls to turn grist mills. Today these falls generate hydro-electric power to keep our industrial wheels turning. Monarch among these power sites is Niagara. Here the two Sir Adam Beck stations produce 1,804,200 kilowatts of power, and this production is matched by the U.S. station.

The agricultural production of this region is well known. In addition, though, the escarpment acts as a store house from which man draws building stone, sand and gravel, brick, shale, and limestone for the blast furnaces of Hamilton.

In this age of burgeoning urbanism, the Niagara Escarpment is receiving increased attention as a recreational area — for fishing, hiking, picnicking, skiing. One of the most important of these new developments is the Bruce Trail Association,

whose aim is to provide a walking trail from Queenston to Tobermory and to preserve the beauty of this natural phenomenon for the benefit of the greatest number.

POINTS OF EMPHASIS

1. Effect on transportation
2. Power resource
3. Storehouse of materials used by man
4. Recreational advantages

SUGGESTED PRE-VIEWING ACTIVITIES

The best preparation for this program would be the viewing of program four.

SUGGESTED POST-VIEWING ACTIVITIES

1. Is the influence of the escarpment on man greater now than in the past?
2. What, in your opinion, will be the most important use made of the escarpment in the future? Why?
3. Discuss the need for and value of conservation in the Niagara Region.
4. Review the advantages and disadvantages presented by the Niagara Escarpment in the economic development of this area.

Bibliography

TOVELL W.M., *The Niagara Escarpment,* Royal Ontario Museum, University of Toronto, 1965.

For current economic information on the Niagara Region write: Niagara Region Development Council, Grimsby, Ontario.

For information on the Bruce Trail Association write: W. T. Cannon, 5183 Hunter Drive, Burlington, Ontario.

PROGRAM 6

SPITS OF LAKE ERIE

This program focuses on the three major spits found in Lake Erie and attempts to explain their formation, characteristics, and present land use. In so doing it is hoped to provide a better understanding of spits in general.

PROGRAM CONTENT

Spits are common features of coastal areas where there are large amounts of sand or other unconsolidated material capable of being moved by the elements. Cape Cod and Cape Hatteras in the U.S.A., those connected with the Rhône Delta and along the west coast of the Gulf of Lions are outstanding examples of this type of formation. The camera focuses on three good examples along the north shore of Lake Erie — Point Pelee, Rondeau and Long Point.

How have these spits been formed? What conditions were necessary for their formation here? Where did the sand come from? How was it moved? Are these spits typical? All questions are answered as the formation of these unusual features is diagramatically sketched from glacial times to the present. The parts of the spit are graphically indicated and comparison photos attest to the changes in the shoreline.

Sand and water, few people, isolation— how can these features be useful to man? The program examines this question. Beaches, bathers, camping and recreation give an obvious answer. Because of its isolation and southern position on a major flyway, bird watching or a bird sanctuary is another possibility. Its use for agriculture is investigated and the spit is found desirable for certain types of crops. Disadvantages? Certainly. Shifting sand does not make for good ports. Shallow water presents shipping hazards and currents present problems to swimmers.

Ths spits continue their development — building, shifting, ever-changing. Are they a new southern frontier or do they herald the end of Lake Erie?

POINTS OF EMPHASIS

1. Formation of spits
2. Changing nature of shoreline
3. Present land use
4. Need for conservation

SUGGESTED PRE-VIEWING ACTIVITIES

No previous preparation is necessary for viewing this program. The following are suggestions as to how the program might be profitably used.

1. A discussion of emergent or depositional coasts in which prominent spits might have been mentioned
2. A series of lessons on Southwestern Ontario
3. A discussion on conservation, recreation, or tourism

SUGGESTED POST-VIEWING ACTIVITIES

1. By means of a fully labelled diagram show how a spit is formed. Distinguish between build and lee shores.
2. Why are conditions more favourable for spit development in Lake Erie than in Lake Ontario?
3. What benefits are derived by man from the spits in Lake Erie?
4. Discuss the need for and value of conservation in these areas.

VOCABULARY

spit, scallop, build shore, longshore current, lee shore, flyway.

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PROGRAM 7

LAKE IROQUOIS PLAIN

In this program we examine the lacustrine plain left by the recession of glacial Lake Iroquois. Our purpose is to explain the origin of the plain, its characteristics and its influence upon the settlement pattern and land use of the region.

PROGRAM CONTENT

The recession of glacial Lake Iroquois to the present Lake Ontario boundaries left a lacustrine plain, up to 6½ miles wide extending from the Niagara to the Trent Rivers, known as the Iroquois Plain. Today this plain has the most factories, biggest cities and richest farmland in Ontario. It directly supports one third of Ontario's population.

Many of the viewers will live in or near this plain. What is it really like? To answer, the camera highlights the plain from many vantage points, giving added emphasis to its effect on topography and on the fertility of its soil.

The huge concentration of people needs explanation, and this too, receives attention. The fertile soils that first attracted eager settlers today support highly successful and progressive farmers. From the renowned Niagara fruitlands to the tobacco and apple lands of the Cobourg-Trenton area agriculture is still a major occupation.

Early urban development needed flat land for expansion. Centres such as Toronto, Hamilton, and a score of others that developed around ports, quickly expanded out into the flat land of the plain. In many cases the old Iroquois shore bluffs temporarily confined this expansion to the plain. Today one can still see former major throughfares that run alongside these bluffs, i.e. number eight highway in the Niagara area; Davenport Road in Toronto. The development of manufacturing industries brought with it rapid urban expansion and increased demand for transportation and other goods and services

Today in this area, now known as the Golden Horseshoe, we have the heaviest concentration of people in Canada. More people now live on the old bed of glacial Lake Iroquois than the total number living in any of the other provinces, with the exception of Quebec. The price for this most favoured position, is to be found in increasing land values, decreasing farm area, and traffic congestion.

POINTS OF EMPHASIS

1. Physical characteristics of plain
2. Agricultural land use
3. Urban development and population concentration

SUGGESTED PRE-VIEWING ACTIVITIES

No previous preparation is needed to view this program with value. Some suggestions for its use might be:

1. Following a discussion of lacustrine plains in Grade 11,
2. During a discussion of South Central Ontario or the Golden Horseshoe,
3. In a discussion of urban development and expansion.

SUGGESTED POST-VIEWING ACTIVITIES

1. From a county soil map contrast the soils above and below the Iroquois shoreline. Suggest reasons for any differences found.
2. On a topographic map of your area (if possible) find the Iroquois shoreline. Are there any differences in land use above and below this feature.
3. Is the present urban expansion on the plain likely to continue? Why?
4. With some classes, teachers might like to initiate a discussion on the disappearing agricultural lands and the effects thereof.

VOCABULARY

Lacustrine plain, shore bluff, urban encroachment.

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KRUEGER R. et al, *Regional and Resource Planning in Canada,* Holt Rinehart & Winston, Toronto 1963.

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Niagara Regional Development Council, Grimsby, Ontario.

PROGRAM 8

THE LAND OF THE SLEEPING GIANT

In this program our camera swings north to the Lakehead, to the twin cities of Fort William and Port Arthur. Here, in an area unfamiliar to most of us, a regional approach is used to help explain the environment, and to show how man has made use of this important region.

PROGRAM CONTENT

To most of us "the Lakehead" is a word that conjures up visions of iron ore and grain carriers, elevators and port facilities, ice breakers and isolation, and little else! This program will pull back the curtain and dispel some of our ignorance about this very important region. The title of the program arises from a spectacular rock formation — Thunder Cape — that resembles a sleeping giant guarding the entrance to Thunder Bay. The Indians have a romantic legend about Nana Bijou and his gifts to explain this formation. Our explanation, of diabase sills and differential erosion, while more scientific, is less fanciful.

In any event, with diagrams, animated graphics, and the probing eye of the camera, the program traces the evolution of this area from Precambrian times to the present. The formation of the highlands, buttes and mesas; the effects of glaciation; and the influence of the present Kaministikwia-Whitefish-Slate river system are all described and explained. Thus when man arrives on the scene he finds a plain surrounded on three sides with

highlands, and on the fourth an excellent harbour protected by a sleeping rock giant!

What has man accomplished with his environment? This too receives attention as the program discusses the agricultural production of the plain, the functions of the twin cities and the importance of this area to Canada as a whole. For in this area where east meets west, where land routes meet the Seaway, where spectacular scenery meets the tourists' eye, man has prospered and the region has merited its prominence which extends far beyond its local bounds.

POINTS OF EMPHASIS

1. Formation of mesas and tablelands
2. Development of lowland
3. Present economic activities

SUGGESTED PRE-VIEWING ACTIVITIES

1. Students should know the location of this area and something of its present importance.
2. It could profitably be viewed after a discussion of mesas and tablelands, during a discussion of this area, or during a discussion on urban development.

SUGGESTED POST-VIEWING ACTIVITIES

1. By means of diagrams show how mesas are formed.
2. Does the Lakehead present a good situation for urban development ? Why?
3. Suggest reasons why this area would make a good tourist or recreational area.

VOCABULARY

mesa, tableland, diabase, differential erosion, transhipment centre.

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PROGRAM 9

THE OTTAWA VALLEY

In this final program of our series an attempt is made to not only present an integrated study of a river valley, but also to review many of the landforms previously discussed in the series. Our study of the river valley will attempt to show how man's use of a river changes with the difference in the river's physical characteristics and with man's level of technological development.

PROGRAM CONTENT

From its source in La Verendyre Park to its confluence with the St. Lawrence, the Ottawa River drains a basin of some 47,000 square miles (17,000 in Ontario, 30,000 in Quebec). Within this basin, where English and French meet, one sees many ways in which man is making use of this river. One also hears many tales of the river in days gone by — of voyageur, trapper and lumberjack. For here is a river that is as important today as it has been historically.

Our study begins with a look at the river itself, examining its physical characteristics as we trace its course from its source in the Canadian Shield, to Lake Temiskaming, through the gorge to Mattawa, across the old delta deposits, between the cliffs of the Bonnechere Graben, across the Champlain clay plains and finally to its meeting with the St. Lawrence at Montreal. (Within this valley are representative examples of many of the landforms we have previously examined in this series).

With this knowledge we turn to a study of man's use of the Ottawa. From its beginning as a transportation artery for explorer and fur trader, we see how man's use of the river has multiplied as his technological skill has improved. Lumberjack, prospector, settler, industrialist — all have relied on the river in some measure for their success. And yet with this aid to economic development, the Ottawa has always been a scenic playground providing ample facilities for boating, bathing, camping, hiking, etc. Thus we see a representative cross section of Ontario's economic development; just as the landforms of the valley are a representative cross section of our Ontario landscapes.

POINTS OF EMPHASIS

1. Changes in physical characteristics of the river from source to mouth
2. Changes in use of river based on advancing technology
3. Present use of river and valley

SUGGESTED PRE-VIEWING ACTIVITIES

1. This program requires no special preparation to be viewed with value. Its most profitable use would be during a discussion of Eastern Ontario, as a study in river development, or during a review of Ontario landforms.

SUGGESTED POST-VIEWING ACTIVITIES

1. Describe and account for the differences in the Ottawa River from source to mouth.
2. Account for the historical changes in the use of the river.
3. "Multiple use is the key to wise use of a river". Discuss this statement with reference to the Ottawa River.
4. "The Ottawa is one of the few rivers of Canada that is as important today as it has been historically". Explain.

Bibliography

CHAPMAN & PUTNAM, *The Physiography of Southern Ontario,* Second Edition, U. of T. Press, Toronto 1966.

INNIS, *The Fur Trade in Canada,* University of Toronto, 1956.

PROVOST G., *Resources for Tomorrow* — Supplementary Volume, *A Typical Drainage Basin, The Ottawa River,* Queen's Printer, Ottawa, 1961.

GEOGRAPHY – Senior Division
LANDFORMS OF ONTARIO 9 programs, 15 minutes each

Prog. No.	CBC	CHCH 9:10-9:25	CKCO 10:15-10:30	CKLW
1	DEC. 2 – 9:30-9:45	JAN. 8	OCT. 21	OCT. 21 – 11:15-11:30
2	JAN. 13 – 9:40-9:55	JAN. 15 JAN. 16	OCT. 28	OCT. 28 – 11:15-11:30 NOV. 4 – 10:45-11:00
3	JAN. 20 – 9:40-9:55	JAN. 22 JAN. 23	NOV. 4	NOV. 18 – 10:45-11:00
4	JAN. 27 – 10:15-10:30	NOV. 4 – 9:30-9:45 NOV. 6 JAN. 29 JAN. 31	NOV. 26 – 9:30-9:45	DEC. 3 – 10:30-10:45
5	FEB. 4 – 9:45-10:00	NOV. 15 FEB. 12	NOV. 28 DEC. 3 – 9:30-9:45	DEC. 10 – 10:30-10:45
6	FEB. 18 – 9:45-10:00	NOV. 18 – 9:30-9:45 NOV. 20 FEB. 19	DEC. 5	DEC. 12 – 11:15-11:30
7	FEB. 24 – 10:15-10:30	NOV. 25 – 9:30-9:45 NOV. 27 MAR. 5	DEC. 15 – 9:30-9:45	DEC. 17 – 10:30-10:45
8	MAR. 12 – 10:15-10:30	DEC. 4 MAR. 6	DEC. 12	DEC. 19 – 11:15-11:30
9	MAR. 24 – 10:15-10:30	DEC. 11 DEC. 18 MAR. 12	DEC.17 – 9:30-9:45	JAN. 7 – 10:30-10:45

LANDFORMS OF ONTARIO